

Handwritten signature
A-128
09/98

METALLGESELLSCHAFT AG

Reuterweg 14

D-60323 Frankfurt/Main

Case No. 93 01 27

Device for Automatically Emptying a
Bulk Container

Description

Background of the Invention

The present invention relates to a device for automatically emptying a box-shaped bulk container via its one front board wall capable of being tilted towards one of the lateral board walls.

Devices for emptying large containers perform tilting and bouncing movements. By means of an enormous amount of equipment, the containers are opened on the devices, tilted, emptied and brought into the horizontal position. This procedure is very costly in the case of complex and hardly accessible plants. Emptying a plurality of containers within a relatively short period of time requires a large amount of personnel. The coordination of the operating sequences is binding capacities.

Summary of the Invention

It is the object of the present invention to provide a device for automatically emptying a box-shaped bulk container, onto which the bulk container can be put by means of conventional

- 2 -

reloading means and can be transferred without much effort and be emptied quickly.

This object is solved by a device comprising a base with a frame mounted thereon, which is pivotally mounted on the base at its one broadside and can be tilted upwards in longitudinal direction by up to 60°, and with which the bulk container mounted thereon for being tilted over the tiltable front board wall can be rigidly coupled, where the processes of coupling and uncoupling between bulk container and frame, of unlocking and locking as well as of swinging the front board wall open and closed by means of a rotating mechanism and of tilting the frame can be performed under program control.

The GR-A-254595 discloses a device for emptying a box-shaped container filled with bulk material, where for emptying purposes the container open at the top must first be closed by means of a cover formed of two portions and is then tilted by about 140°, so that the cover inclined with respect to the horizontal then forms the bottom of the container and the lower portion of the cover is opened for emptying the bulk material. This device can, however, not be used for automatically emptying a box-shaped bulk container which can be emptied via one of its front board walls.

The device in accordance with the invention operates fully automatically. A crane is putting the bulk container onto the frame. The bulk container is rigidly coupled with the frame by means of a twist-lock system. The twist-lock system is operated hydraulically. As soon as a hydraulically actuated cylinder has released the locking rods of the bulk container via a lever mechanism, the tiltable front board wall thereof is unlocked by a program-controlled, hydraulically actuated cylinder, in that unlocking is released by means of a bolt. By means of an electrically operated rotating mechanism the tiltable front board wall is opened, and upon opening the

- 3 -

same, the frame is tilted upwards by means of a hydraulic cylinder, so that the contents of the bulk container can slide out of the same. The emptying process can be accelerated in that the frame is set in a pulsating movement by means of the hydraulic cylinder. Upon returning the frame to the horizontal position, the base can be moved on a track to a laterally disposed washing place, where the bulk container firmly connected with the frame can be rinsed with water and cleaned.

A preferred embodiment of the invention consists in that by means of the rotating mechanism the tiltable front board wall can be swivelled by up to 250° towards one of the lateral board walls. This opening angle is particularly advantageous, as the bulk material can unimpededly leave the bulk container without a risk of damaging the front board wall.

In accordance with the further embodiment of the invention, emptying the bulk container is accelerated in that the frame can be set in pulsating movements. Particularly short emptying periods are achieved with a frequency of 3 times in 1.5 sec.

Upon emptying the bulk container, the frame can be tilted back to an angle of inclination of about 15°. With this angle of inclination, cleaning the bulk container is performed very efficiently.

An expedient device consists in that the base can be moved on a track by means of an electric drive. The device can also be mounted on a movable base, for instance on a truck.

In accordance with the invention, the device can be used for emptying biological containers of a composting plant for biological waste.

- 4 -

The invention is represented in the drawing by way of example and will subsequently be explained in detail, wherein:

Brief Description of the Drawing

Fig. 1 shows a side view of the device with a bulk container.

Fig. 2 shows a section A-A of the device in accordance with Fig. 1.

Detailed Description of the Invention

By means of a crane, the bulk container 2 is put onto the frame 1 of the base 15 and rigidly coupled with the frame 1 by means of a twist-lock system 3. The twist-lock system 3 is operated hydraulically under program control. As soon as a program-controlled, hydraulically actuated cylinder 8 has released the locking bolt 10 by means of a lever mechanism 9, an unlocking bolt is introduced into the lug 14 of the locking rods 12 of the front board wall 5 by means of a program-controlled, hydraulically actuated cylinder 11. Subsequently, the locking rods 12 of the front board wall 5 are pulled downwards by a program-controlled, hydraulically actuated cylinder 13, so that the front board wall 5 is unlocked. When the bulk container 2 is lowered, a rotating mechanism 4 mounted on the frame 1 for opening the front board wall 5 is introduced into a lug 6 disposed on the front board wall 5. Upon lowering the bulk container 2, the front board wall 5 is opened by means of a rotation of about 250° effected by the rotating mechanism 4. Subsequently, the frame 1 is tilted by about 60° by means of a program-controlled, hydraulically actuated cylinder 7. The frame 1 can pulsate by means of the cylinder 7 with a frequency of 3 times in 1.5 sec. The bulk container 2 is emptied and then tilted back into the horizontal position. Subsequently, the base 15 is moved for about 5 m towards the washing station, and the frame 1 is moved upwards to an angle of 15° by means of the hydraulically actuated cylinder 7. In this position, the bulk container 2 is washed. Upon washing, the frame 1 is tilted back into the

- 5 -

horizontal position. The front board wall 5 is closed and locked under program control. Then, the bulk container 2 is uncoupled under program control by means of the twist-lock system 3. The bulk container 2 can be lifted from the frame 1 by means of a crane.